

CHARACTERIZATION OF DRUDGERY IN COTTON PRODUCTION SYSTEMS

A. MRUNALINI¹, D. ESTHER² & J. DEEPIKA³

¹Professor and University Head, Department of Resource Management and Consumer Sciences,

Faculty of Home Science, Professor Jayashankar Telangana State Agricultural University, Hyderabad, Telangana, India

^{2,3}P. hd. Student, Department of Resource Management and Consumer Sciences,

College of Home Science, Professor Jayashankar Telangana State Agricultural University, Hyderabad, Telangana, India

ABSTRACT

A survey was conducted in five operational villages of Chevella mandal of RR district, Telangana state, to characterize drudgery of women working in cotton production system. Thirty women were taken as sample comprising 10 per cent of cotton growing families. Interview schedule was developed to collect the data from farm women by recall method on six factors viz; physical load, posture load, repetitive strain load, physiological load, time load and musculoskeletal disorder load. Results confirmed that factors contributed to the variance in drudgery load of activities. Based on population distribution, the activities were qualified as per factors associated through chi square test.

KEYWORDS: Drudgery, Farm Women, Cotton Production, Characterization

INTRODUCTION

Cotton plays a vital role in Indian agricultural economy and offers employment for about 60 million people. Telangana farmers grow cotton in 14 lakh hectares during a normal kharif season under rain fed conditions. Women workers in majority are preferred as workers in commercial agriculture like tea, coffee, sugarcane, cotton, tobacco and plantation products (Singh et al 2007). Dibbling, weeding and hand picking are the important productions related activities that demand women labour. In recent years, labour shortages during peak periods of cotton production; have been quite frequent and widespread. Traditionally, women do the exclusively tedious, time and labour intensive works resulting in fatigue and drudgery (Shilparani, 2007). To relieve the drudgery of women in production system activities, it is needed that the activities are characterized by associated factors contributing to drudgery so that suitable interventions could well be designed. Therefore, the study was planned with an objective to characterize drudgery by the factors most associated with it.

REVIEW OF LITERATURE

Chayal and Dhaka (2010) analyzed the work participation of women in agriculture in Bundi district of Rajasthan. A total of 200 farm women selected as respondents through proportionate random sampling. The selected respondents were interviewed personally using pre-tested well structured interview schedule. The findings showed that farm women's participation was maximum in cutting, picking, cleaning of grains, drying of grains, storage, processing, weeding, winnowing and major part of cleaning of field, raising. Participation of farm women in agriculture was significantly affected by socio-economic variables like –age, family income, land holding.

Sunita et al. (2012) conducted a study on drudgery reduction of farm women with cotton picking bags. Picking efficiency, energy expenditure, carrying capacity, ease, comfort, safety, loading and unloading etc. were evaluated between Hisar and Prabhani designed cotton bags. Results revealed that cotton bags designed by Hisar was having 50% higher carrying capacity, ease in tying, 37% less load on heart beats, 18% lower energy (kJ)expenditure and proved significantly superior over Parbhani designed picking bags. Hisar bag required 25% and 15% extra cloth and costs respectively over Parbhani bag. No significant difference was reported due to age and type of bag.

A study by AICRPH (2004) and DDK (2007) observed that cotton picking manually involved a lot of drudgery due to posture and abrasion of fingers due to sharp points of dried bracts. Through the efforts of testing and popularizing cotton harvest bags, they opined that picking efficiency was increased and labour costs, trash contents were decreased.

Narinderjit et al. (2007) purposively selected 60 female respondents who were intensively involved in cotton-picking activity in Bathinda district of Punjab state. Field experiments were conducted to compare the ergonomic cost in terms of physiological responses between conventional and improved techniques of cotton picking (improved bag and plucker). Results of the study exhibited significant reduction in Heart Rate (7.29%), Energy Expenditure (17.30%), Total Cardiac Cost of Work (43.75%) and Physiological Cost of Work (43.76%) with the use of improved methods. Women adopted improved bag and plucker and as users, they were satisfied and relieved of their drudgery.

METHODOLOGY

Characterization in the context is the concept of portraying the qualities of an activity in the selected production system that is either constraining the effective work performance of a worker or causing risk to health and safety of worker. Bench mark survey method was followed based on criteria of accessibility, willing cooperation of respondents, five villages were selected and made operational for the present study. They were drawn from two mandals namely, Moinabad and Chevella of RR district from Telangana state. Kethiradipalli, Tolkata, Bakaram, Ethabarpalli and Nagireddyguda therefore were formed as operational villages as cotton growers were found to an extent of 300 from marginal landholdings.

The survey was planned after all the production related activities were identified and were made into sub tasks. Among them, only the women exclusive and women dominant or women equal participation tasks were selected for characterizing activities as per factors during survey. Thirty women farmers representing 10 per cent of cotton growers from the operational villages were selected for the survey. Interview schedule was developed and standardized to collect the data from farm women by recall method. The interview schedule contained general information, where in details on subject's age, years of farming, family size and income, land holding status, crop calendar, gender participation and technology used were elicited apart from six variables viz; physical load, posture load, repetitive strain load, physiological load, time load and musculoskeletal disorder load. Each factor was measured using quantitative and qualitative methods as furnished in Table 1.

Table 1: Drudgery Factors and their Measurement

| S. No. | Variables | Attributes |
|--------|---------------|---|
| 1 | Physical load | a. Weight of the load (kgs) b. Distance carried (kms) c. Height lifted (mts) d. Physical load rating(5 point scale) e. Physical load factor |

| Table 1: Contd., | | |
|------------------|------------------------|---|
| 2 | Posture | a. Nature of posture b. Body part involved c. Discomfort rating (5 point scale) d. Posture load factor |
| 3 | Repetitive strain | a. Nature of work b. Repetitive strain rating (5 point scale) c. Repetitive strain load factor |
| 4 | Physiological load | a. Physiological load rating (5 point scale) b. Physiological load factor |
| 5 | Duration / time | a. Hours / day b. No. of days c. No of labour employed d. work load as per time e. Time load factor |
| 6 | Body pain and disorder | a. Body part involved b. Body disorder symptoms c. Body pain rating (5 point scale) d. Frequency e. Posture load factor |

Activities were considered as independent and the six factors as dependent variables and a null hypothesis was formulated for the purpose of understanding the source of variation from among the activities and factors for the purpose of the study.

N0: There is no significant variation in drudgery load between activities.

There is no significant variation in drudgery load due to factors.

Analysis of variance and chi square tests were conducted to confirm and characterize drudgery. Total drudgery was calculated using linear combination method as per the formula given below.

Total Drudgery = (dr(PL) + dr(P) + dr(RS) + dr(T) + dr(MSDs) + dr(PysL)

Where, dr (total)= Total drudgery ;

PL – Physical Load (25 points) ;

P – Postural Load (25 points) ;

RS – Repetitive Strain Load (25 points) ;

T – Time Load (25 points) ;

MSDs – Musculoskeletal Disorders (25 points) ;

PhsL – Physiological Load (25 points)

Drudgery Index %(DI) = [100 * dr (total)] / 150

Drudgery Level Categorization was done as Follows

Assuming that manual physical works done beyond one third (30%) human capacity may be treated as heavy, the drudgery index was categorized for interpretation as below. It also equated to the physiological load calculated by heart rate method.

Table 2

| Drudgery Index | Expected Equivalent Heart Rate |
|-------------------------|---------------------------------------|
| < 10% = Very low | |
| 10 – 20 % = Low | Up to 90 b.min ⁻¹ |
| 20 – 30 % = Moderate | 91 - 105 b.min ⁻¹ |
| 30 – 40 % = High | 106 - 120 b.min ⁻¹ |
| 40 – 50 % = Very High | 121 - 135 b.min ⁻¹ |
| > 50 % = Extremely High | 136 - 150 b.min ⁻¹ |

RESULTS AND DISCUSSIONS

Crop Calendar

Cotton production activities were being done for seven months during Kharif in Telangana region. Mostly it was grown under rain fed conditions as commercial crop. Land preparation activities namely tillage, removing stalks and stubbles took place in the month of June and July with the onset of monsoon. Manuring and fertilizer application was done before sowings from mid July to August. Sowing was mostly done by dibbling method and after 15 days gap filling was done. Inter culture operations and weeding between plants was done during September and October and later for every 15 days. During this time, necessary pest management also was done. November and December were the months for cotton picking.

Gender Participation

Gender participation in cotton production tasks revealed that, women exclusively participated in removing stalks, sowing, weeding and crop harvesting. Land tillage, row marking, interculture operations, pest management were considered as men exclusive tasks. Women belonging to Small & marginal farm category spent one or two days in their own farm followed by extending as wage labor for about 10 – 15 days in the village in other farms. Hand weeding was being done twice per season in addition to inter culture operations. Inter culture operations were being done 6 times that means for every 10 to 15 days between rows. Cotton harvesting by manual picking method was being practiced and about three pickings were done as minimum if the crop did not fail.

Technology Use

Majority of the activities done by women were being manually performed. Removing stalks was being done by manual pulling and gathering them for burning in the yard. Dibbling activity was being done after marking the rows and sometimes even between plants as 2ft & 1 ft respectively. Spreading manure was another activity done by women with the help of local baskets made of iron. Traditional kurpi was the common tool used for hand weeding and cotton harvest was done twice in the season by manual picking using bare hands. Wooden plough was used for marking rows and tillage was being done by using tractor and intercultural operations with local cattle drawn hoe (guntuka)

Drudgery Load as Per Activity

As per drudgery index, viz., Removing stalks and stubbles (37), spreading of manure (38) and harvesting (39) were categorized as having high level drudgery where as sowing (42), weeding (42) were found to be having very high level drudgery. As per ANOVA, there was no significant variation between activities when drudgery load was considered. This infers that all the activities were dependent on the drudgery factors. Chi-square test of association was conducted for the sample based on major population distribution behavior.

Table 3: Drudgery Load as Per Activity

| Farm Activity | Removing Stalks and Stubbles | Spreading of Manure | Sowing - Dibbling | Weeding - Plant To Plant | Harvesting | Factor Wise Drudgery Load |
|------------------------------------|------------------------------|---------------------|-------------------|--------------------------|------------|---------------------------|
| Physical Load | 3 | 3 | 3 | 4 | 2 | 15 |
| Posture Load | 9 | 14 | 20 | 19 | 4 | 65 |
| Repetitive strain load | 20 | 8 | 15 | 20 | 16 | 79 |
| Physiological load | 3 | 16 | 3 | 8 | 8 | 38 |
| Time load | 6 | 3 | 12 | 4 | 16 | 41 |
| MSD load | 15 | 13 | 10 | 8 | 12 | 58 |
| Activity wise drudgery load | 55 | 57 | 63 | 63 | 58 | 296 |
| Drudgery Index | 37 | 38 | 42 | 42 | 39 | |

As per test of associations, drudgery load while removing of stalks and stubbles was found highly associated with posture, spreading of manure was associated with posture, physiological load and MSD, sowing activity was associated with Posture, Repetitive strain and Time load, weeding activity was associated with physiological load and MSD and drudgery load in harvesting activity was associated with physiological load, Repetitive strain, Time load and MSD at 5% level. The results lead to the carefully planning needed while conducting technology interventions in the production system.

Factors Contributing to Drudgery

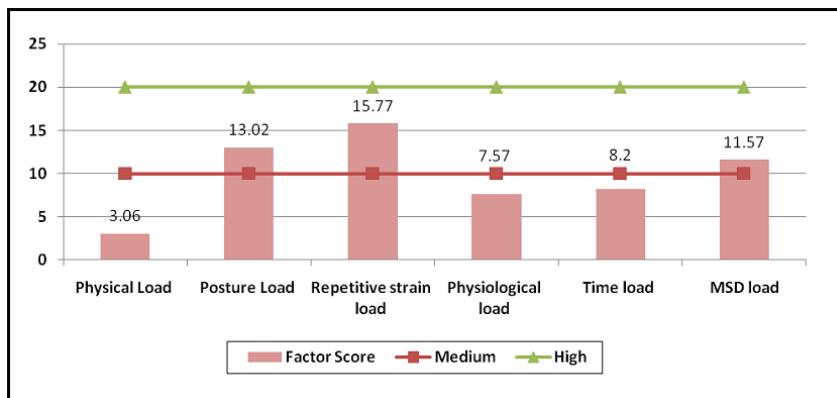


Figure 1: Factors Characterization Drudgery in Cotton Production System-Hyderabad

Among the factors impacting overall drudgery in cotton production system activities, it was indicated that repetitive strain load followed by posture and MSD load were contributing in a priority order. The test of ANOVA, confirmed the significant variation in drudgery load attributed to the drudgery factors. Posture had thirty three percent of variation in drudgery load due to sowing, weeding and manuring activities. Twenty three percent of variation in drudgery due to factors was from physiological factor and manuring was found to be involving physiological drudgery. Twenty percent of the variations contributed by time factor were found due to harvesting activity. Though physiological and time loads were considerable to handle, they were not rated important as per priority order by farm women. Women while performing the pulling and gathering of small stalks, weeding, sowing handle approximately 3kg of weight at a time and walk up to 2 km distance in each of the activities. However, women did not perceive while rating physical loads as priority and that was probably the reason for the low factor load on account of physical loads. The discomfort rating arising due to postures on body parts were found to be more while dibbling, weeding and spreading manure. But drudgery on account of

postures was rated as low in priority while removing stalks and harvesting and therefore posture was found to be contributing to moderate drudgery. Repetitive strain load Repetitive strain factor was observed to be contributing to a moderate extent to drudgery of women Working while removing stalks and weeding.

Table 4: ANOVA for Drudgery Load on Cotton Production Activities and Factors N=30

| Source of Variation | SS | Df | MS | F | P-Value | F Critical |
|---------------------|----------------|--------------|----------------|-------|--------------------|------------|
| Factors | 510.61 | 5.00 | 102.12 | 3.81* | 0.01 | 2.71 |
| Activities | 8.39 | 4.00 | 2.10 | 0.08 | 0.99 | 2.87 |
| Error | 536.07 | 20.00 | 26.80 | | | |
| Total | 1055.07 | 29.00 | 1055.07 | | *Significant at 5% | |

CONCLUSIONS

From the above study, it was concluded that the drudgery load was varied based on activities and factors from low to very high level. As per ANOVA, there was no significant variation between activities when drudgery load was considered. This infers that all the activities were dependent on the drudgery factors. Among the factors, chi-square test of association was conducted for the sample based on major population distribution behavior. Drudgery load of activities removing of stalks and stubbles was found highly associated with posture, Repetitive strain and MSD, spreading of manure is associated with posture, physiological load and MSD, sowing activity is associated with Posture, Repetitive strain and Time load, weeding activity is associated with physiological load and MSD and drudgery load in harvesting activity was associated with physiological load, Repetitive strain, Time load and MSD at 5% level.

REFERENCES

1. AICRPH. (2004). Annual report of all India coordinated Research project on Home Science.
2. Anonymous. (2011). Cotton's Journey - The Story of Cotton - production, www.cottonsjourney.com/Storyofcotton/page4.asp (online)
3. Chaudhary, M. R. (2011). Harvesting and ginning of cotton in the world, www.icac.org/cotton_info/speeches/Chaudhry/ BW97.pdf (online).
4. Chayal, Dhaka, (2010). Analysis of role performance of women in farm activities. *Indian research journal of extension education*. 10(2): 109-111.
5. Narinderjit, Dhillon, Sidhu, Pushpinder. (2007). Physiological responses during cotton picking activity performed by rural women of bathinda district. Comparison of conventional and improved methods. *Women at work*. Allied publishers private limited. HWWE. Bhopal. 2:28-33.
6. Singh, Gite, Nidhi, Majumdar. (2007). Women friendly Improved Farm Tools and Equipment. *Bhopal Central Institute of Agricultural Engineering*. Bhopal
7. Sunita, Raju, Majumdar, Meshram. (2012). Drudgery Reduction of Farm Women with Cotton Picking Bags. *Indian Research Journal of Extension Education*. 1: 118-120.
8. Shilparani. (2007). A study on the perception of farm women about the efficiency of selected drudgery reduced farm implements. *M.Sc. (Agri.) Thesis, (Unpublished), University of Agricultural Science*. Bangalore.